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REMARKS

Claims 4, 13, and 55 are currently amended. Claims 1, 3, 5, 9-10, 12, 14, 16-17, 19-24, 26-27, and 56-61 were previously presented. Claim 24 has been rejoined and is labeled previously presented above. Claims 2, 6-8, 11, 15, 18, 25, and 28-54 are canceled. Accordingly, claims 1, 3-5, 9-10, 12-14, 16-17, 19-24, 26-27, and 55-61 are pending examination.

Objection

Claim 4 is amended to address the cited informalities.

Rejection of Claims Under 35 USC §103(a)

Claims 1, 3-5, 9, 10, 12-14, 16, 17, 19-24, 26, 27, and 55-61 are rejected under 35 USC §103(a) as being obvious over U.S. Patent No. 5,606,077 (Lersch).

Lersch Is Non-Analogous Prior Art

In order "to rely on a reference under 35 USC §103, it must be analogous prior art." See header of MPEP §2141.01(a). Applicant submits that Lersch is non-analogous art.

MPEP §2141.01(a) provides a two-part test for determining whether a piece of prior art is analogous prior art. First, "the reference must ... be in the field of the applicant's endeavor." MPEP §2141.01(a) also cites *Wang Laboratories, Inc. vs. Toshiba Corporation*, 993 F.2d 858, 26 U.S.P.Q. 2d 1767 (Fed. Cir., 1993). Applicant's field of endeavor is batteries (see Background) while Lersch's field of endeavor could be characterized as additives for dispersion paints or lacquers (see Abstract and C5, L51-52); or could be characterized as coatings for the surfaces of pigments and fillers (see Abstract and C5, L51-52); or as polymer synthesis (see Abstract and Title). In any of these cases, Lersch's field of endeavor could NOT be characterized as batteries. As a result, Lersch fails the first part of the test.

MPEP §2141.01(a) sets forth the second part of the two-part inquiry when it states that if the reference is not in Applicant's field of endeavor, it must "be reasonably pertinent to the particular problem with which the inventor was concerned." Further, a "reference is reasonably pertinent if ... it ... logically would have commended itself to an inventor's

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attention in considering his problem." See MPEP §2141.01(a) citing to *Wang Laboratories Inc. v. Toshiba Corp.*, 993 F.2d 858, 26 USPQ2d 1767 (Fed. Cir. 1993).

The "particular problem" addressed by the claimed invention is easily identified from the Background of the specification. The last two sentences of the Background state the following:

... polysiloxane based electrolytes typically have a low ionic conductivity that limits their use to applications that do not require high rate performance. As a result, there is a need for polysiloxane-based electrolytes with an increased ionic conductivity.

As a result, the inventors are addressing the problem of low ionic conductivity in polysiloxane-based electrolytes. However, since Lersch does not even teach using the disclosed polysiloxanes in the electrolyte of an electrochemical device, Lersch does not suggest that Lersch's polysiloxanes would increase the ionic conductivity of such an electrolyte. As a result, the inventors would not have consulted Lersch in order to solve their problem.

Because Lersch is both from a different field of endeavor and is not reasonably pertinent to the Applicant's problem, Lersch fails both parts of the MPEP §2141.01(a) analogous art test. Because Lersch is not analogous prior art, Lersch is not available for use in a rejection of these claims under 35 USC §103 and the rejections should be withdrawn.

Lersch Does Not Teach or Suggest Every Element of the Claims

There is nothing in Lersch that teaches or suggests including Lersch's polysiloxane in the electrolyte of an electrochemical device. The Office Action notes that Lersch states that the "siloxanes ... can also be used as new polymeric materials for optical and electronic applications." However, teaching that Lersch's polysiloxane can be used for "electronic applications" does not suggest using them in the electrolyte of an electrochemical device. For instance, even if the Applicant accepted that the claimed electrochemical device was an "electronic application" as cited in Lersch, this phrase still does not suggest that the polysiloxane be used in an electrolyte of the "electronic application." As a result, it cannot be argued that this phrase suggests including Lersch's polysiloxane in the electrolyte of an electrochemical device. For this reason alone, the pending claims are patentable over Lersch.

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Further Prosecution

For the purposes of further prosecution, the Applicant attaches copies or printouts of the following publicly available documents. At this time, the Applicant makes no representation regarding the contents of these documents.

1. "electrochemical." *Websters New World College Dictionary*. 4th ed. 2006, pp 458.
2. Definition of electrochemistry, first page printed from <http://en.wikipedia.org/wiki/Electrochemical> on March 20, 2008.
3. First page printed from <http://www.kmle.com/search.php?Search=electrochemical&DictDefAll=YES&DictLinkAll=YES&DictAbbreviationAll=YES&DictEngAll=YES&WebDef=YES&HTMLWebHtdig=Y> ES on March 20, 2008.
4. Zumdahl, Steven S., *Chemistry*, D.C. Heath and Company, 1986, pp. 715.
5. "electronics." *Websters New World College Dictionary*. 4th ed. 2006, pp 459w.
6. Definition of electronic printed from <http://dictionary.reference.com/browse/electronic> on March 20, 2008.

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CONCLUSION

The Examiner is encouraged to telephone the undersigned with any questions.

Respectfully submitted,



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Eleanor of Aquitaine / electrojet 458

Eleanor of Aquitaine 1122-1204: queen of France (1137-82) as the wife of Louis VII & queen of England (1154-89) as the wife of Henry II

Eleat-le (el'et a'rik) *adj.* **EL Eleaticus**, after Elea (Velia), ancient Greek colony in Italy designating or of an ancient Greek school of philosophy which held that true being is singular and unchanging and that plurality, change, and motion are illusory; Parmenides and Zeno were its best-known adherents — *n.* an Eleatic philosopher — **Eleat'ic-ism** (el'et a'iz'm) *n.*

Ele-a-zar (el'et a'zar) *n.* [**LL** *Eleazar* < **Gr** *Eleazar*, lit., God has helped] **Bible** Aaron's son and successor as high priest: Num. 20:28

elec *abbrev.* 1 **electric** 2 **electrical** 3 **electricity**
ele-gam-pane (el'i kam pan') *n.* [**ME** *elena campana*, altered < **ML** *enula campana* < **L** *enula* (altered by metathesis < **Gr** *helenion*, prob. < *Helené*, daughter of Zeus) + *campana* < *campus*, field; see **CAMPUS**] a tall, hairy European perennial plant (*enula helenium*) of the composite family, having flower heads with many slender, yellow rays; naturalized in the NE U.S.

elect (el'ekt) *v.* *adj.* [**ME** < **L** *electus*, pp. of *eligere*, to pick out, choose < *el-*, out + *legere*, to pick, choose; see **LOGIC**] 1 chosen; given preference 2 elected but not yet installed in office; usually used in combination (the mayor-elect) 3 **Theol.** chosen by God for salvation and eternal life — *n.* a person who is elect — *vt.* 1 to select for some office by voting 2 to choose; select (*was elected to stay*) 3 **Theol.** to choose for eternal salvation; only in the passive, with God as the implied subject — *vi.* to make a choice; choose — the elect 1 persons belonging to a specially privileged group 2 **Theol.** those chosen by God for salvation and eternal life

elect-able (el'ekt a'bal) *i.* *adj.* capable of being elected — **elect-abil-ity** *n.*

election (el'ek-shon) *n.* [**ME** *eleccian* < **OFr** *election* < **L** *electio*, a choice, in **LL** *Eccl.*, the election of believers; see **ELECT**] 1 a choosing or choice 2 a) a choosing or being chosen for office by vote b) a voting, as in a municipality, on some proposition, issue, etc. 3 **Theol.** the selection by God of certain people for salvation and eternal life

election-eer (el'ek-sha nir') *v.* to canvass votes for, or otherwise work for the success of, a candidate, political party, etc. in an election — **election-eer-er** *n.*

elective (el'ektiv) *i.* *adj.* [**ME** < **LL** *electivus*] 1 a) filled by election (an *elective* office) b) chosen by election; elected 2 of or based on election 3 having the power to choose 4 that may be chosen but is not required; optional 5 [**Now Rare**] having or referring to a tendency to attract or combine with certain substances in preference to others — *vn.* an optional course or subject in a school or college curriculum — **elect-ively** *adv.*

elector (el'ektar) *n.* [**ME** *electour* < **L** *elector*] 1 a person who elects; specif., a qualified voter 2 a member of the electoral college 3 [**transl.** of **Ger** *Kurfürst*, lit., choosing prince] (usually *E-*) any of the German princes of the Holy Roman Empire who took part in the election of the emperor

electoral (el'ektar) *i.* *often* *el'ekt tär'al*, *i* *lek't* *adj.* 1 of an election or elections 2 made up of electors

electoral college (el'ekt E C-) *n.* an assembly elected by the voters to perform the formal duty of electing the president and the vice president of the United States; the electors of each state, equal in number to its members in Congress, are expected to cast their votes for the candidates selected by the popular vote in their state

electorate (el'ektar it) *n.* [**ML** *electoratus*] 1 all those qualified to vote in an election 2 the rank or territory of an elector in the Holy Roman Empire

Electra (el'ekt'ra) *n.* [**LL** < **Gr** *Elektra*, lit., shining one; see **ELECTRIC**] **Gr. Myth.** a daughter of Agamemnon and Clytemnestra; she encourages her brother, Orestes, to kill their mother and their mother's lover, who together murdered Agamemnon

Electra complex (Obs.) [**Psychoanalysis**] the unconscious tendency of a daughter to be attached to her father and hostile toward her mother: cf. **ORIPUS COMPLEX**

electret (el'ekt'rit, -tret) *n.* any of certain solid, dielectric materials that have a permanent electric charge after being melted and resolidified in a strong electric field: used in telephones, microphones, etc.

electric (el'ekt'rik) *i.* *adj.* [**ModL** *electricus* (coined, 1600, by William Gilbert), lit., produced from amber by rubbing < **ALL**, of amber < **L** *electron*, amber, *electron* < **Gr** *ēlektron*, akin to *ēlektron*, shining, the sun < ?] 1 of, charged with, or conducting electricity (an *electric* wire) 2 producing, or produced by, electricity (an *electric* generator) 3 operated by electricity (an *electric* iron) 4 using electronic amplification: said of certain musical instruments (electric guitar, bass, etc.) 5 very tense or exciting; electrifying 6 designating a color that is very bright or metallic (electric blue) — *n.* a train, car, etc. operated by electricity

elec-tri-cal (-tri kal) *adj.* 1 **ELECTRIC** 2 connected with the science or use of electricity (an *electrical* engineer)

elec-tri-cally (-tri kal) *adv.* by or with electricity

electrical storm (Informal) a thunderstorm, esp. one with a great deal of lightning; sometimes called *electric storm*

electric arc **ARC** (see 3)

electric chair 1 an apparatus in the form of a chair, used in electrocuting persons sentenced to death 2 the death sentence by electrocution. Often preceded by *the*

electric eel any of a family (Electrophoridae) of large, eel-shaped

cypripoid fishes of N. South America, having special organs that can give severe electric shocks

electric eye **PHOTOELECTRIC CELL**

electric field the electrically charged region of space surrounding an electrically charged body

electric furnace a furnace heated to high temperatures by an electric current, used in smelting, melting metals, steel making, manufacturing carbides, etc.

elec-tri-cian (el'ekt trish'an; *é* lek', -i) *n.* a person whose work is the construction, repair, or installation of electric apparatus

elec-tric-ity (el'ekt trish'it; *é* lek', -i) *n.* [**face** **ELECTRIC**] 1 a property of certain fundamental particles of all matter, as electrons (negative charges) and protons or positrons (positive charges), that have a force field associated with them and that can be separated by the expenditure of energy; electrical charge can be generated by friction, induction, or chemical change and is manifested by an accumulation of electrons on an atom or body, constituting a negative charge, and a loss of electrons, constituting a corresponding positive charge 2 a) an electric current (see **CURRENT**, *n.* 3) b) an electric charge (see **CHARGE**, *n.* 1, 3) 3 the branch of physics dealing with electricity 4 electric current supplied as a public utility for lighting, heating, etc. 5 strong emotional tension, excitement, etc.

electric needle a high-frequency electrode in the form of a needle, used in surgery to coagulate tissue

electric ray any of an order (Torpediniformes) of cartilaginous fishes with special organs that can produce strong electrical discharges used to paralyze or stun its enemies or prey

electrify (el'ekt'rif) *i.* *vt.* -fied, -fying 1 to charge with electricity 2 to give an electric shock to 3 to give a shock of excitement to; thrill 4 to equip for the use of electricity; provide with electric power — **elec-tri-fy-able** *adj.* — **elec-tri-fi-ca-tion** *n.* — **elec-tri-fier** *n.*

electro (el'ekt'rō) *i.* *n.* -troz' **L** *Gr* *ēlektron* (with sense of **ModL** *electricus*; see **ELECTRIC**) short for **ELECTROTYP**

electro- (el'ekt'rō, -trō; *i.* combining form) 1 **electric** (*electromagnet*) 2 **electrically** (*electrolyte*) 3 **electricity** (*electrostatic*) 4 **electrolysis** (*electrodeposition*)

electro-acous-tics (el'ekt'rō a kōs'tiks) *n.* a branch of acoustics that deals with the conversion of sound into electricity and vice versa, as in a microphone or a speaker — **electro-acous-tic** *adj.* or **electro-acous-tical**

electro-anal-ysis (-nāl'ə sis) *n.*, *pl.* -ses' (-sēz') a chemical analysis of an electrolyte by means of electrolysis — **electro-anal-ytic** (-an'ə lit'ik) *adj.* or **electro-anal-ytic-al**

electro-car-di-gram (-kār'dē a grām') *n.* a graphic tracing showing the variations in electric force which trigger the contractions of the heart: it is used in the diagnosis of heart disease

electro-car-di-ograph (-kār'dē a graf') *n.* an instrument for making an electrocardiogram — **electro-car-di-ograph-ic** *adj.* — **electro-car-di-ograph-ically** *adv.* — **electro-car-di-og-ra-phy** (-nō'grā fē) *n.*

electro-chem-is-try (-kem'is trē) *n.* the science that deals with the use of electrical energy to bring about a chemical reaction or with the generation of electrical energy by means of chemical action — **electro-chem-ical** *adj.* — **electro-chem-ically** *adv.*

electro-con-vul-sive therapy (-kon vul'siv) **ELECTROSHOCK THERAPY**

electro-cute (el'ekt'rō kyūt', -i) *vt.* -cuted, -cutting (**ELECTRO-** + **CUT**) to kill with a charge of electricity; specif., to execute in the electric chair — **elec-tro-cut-ion** *n.*

electrode (el'ekt'rōd) *n.* [**ELECTRO-** + **ODE**] any terminal that conducts an electric current into or away from various conducting substances in a circuit, as the anode or cathode in a battery or the carbons in an arc lamp, or that emits, collects, or controls the flow of electrons in an electron tube, as the cathode, plate, or grid

electro-deposit (el'ekt'rō dē pōz'it, -i) *vt.* -trōz' *vt.* to deposit (a metal, etc.) electrolytically — *n.* a deposit made by an electric current, as in electroplating — **electro-dep-o-si-tion** (-dēp'ō zish'ən) *n.*

electro-di-al-ysis (-dī al'ə sis) *n.*, *pl.* -ses' (-sēz') a type of dialysis in which undesirable ions are removed from solution by means of a direct current passing between two electrodes, one on each side of the membrane

electro-dy-nam-ics (-di nam'iks) *n.* the branch of physics dealing with the phenomena of electric currents and associated magnetic forces — **electro-dy-nam'ic** *adj.* — **electro-dy-nam-ically** *adv.*

electro-dy-na-mom-eter (-dīnō mēm'et er) *n.* an instrument in which the magnetic forces between two parts of the same circuit are used for detecting or measuring an electric current

electro-en-ceph-a-lo-gram (-en sēf'ə lō grām') *n.* [**ELECTRO-** + **ENCEPHALU-** + **-GRAM**] a graphic tracing of minute voltage changes resulting from bioelectric activity in the brain: abbrev. **EEG**

electro-en-ceph-a-lo-graph (-en sēf'ə lō graf') *n.* an instrument for making electroencephalograms — **electro-en-ceph-a-lo-graph-ic** *adj.* — **electro-en-ceph-a-log-ra-phy** (-lōgrā fē) *n.*

electro-form-ing (el'ekt'rō fōrm'ing) *n.* the production or reproduction of articles by the electrolytic deposition of a metal on a conducting mold

electro-hy-drau-lic (el'ekt'rō hi drō'lik, -i) *adj.* designating or of a process for converting electrical energy to high-pressure, mechanical shock waves by the discharge of a high-voltage arc under the surface of a liquid medium: used in metal shaping, breaking up rock, etc.

electro-jet (el'ekt'rō jēt', -i) *n.* a narrow, high-velocity stream

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Electrochemistry

From Wikipedia, the free encyclopedia
(Redirected from Electrochemical)

Electrochemistry is a branch of chemistry that studies chemical reactions which take place in a solution at the interface of an electron conductor (the electrode, composed of a metal or a semiconductor) and an ionic conductor (the electrolyte), and which involve electron transfer between the electrode and the electrolyte or species in solution.

If a chemical reaction is driven by an external applied voltage, as in electrolysis, or if a voltage is created by a chemical reaction, as in a battery, it is an *electrochemical reaction*. Chemical reactions where electrons are transferred between molecules are called oxidation/reduction (redox) reactions. In general, electrochemistry deals with situations where oxidation and reduction reactions are separated in space or time, connected by an external electric circuit to understand each process.



English chemists John Daniell (left) and Michael Faraday (right), both credited as founders of electrochemistry today.

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e-lec-tro-chem-i-cal (ĭ-ĕk-tŕō-kēm'ĭ-kəl)

electrochemical:

adj.

Of or relating to chemical reactions brought about by electricity;
galvanochemical.

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CHAPTER SEVENTEEN

Electrochemistry

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Electrochemistry is an important component of a general chemistry course since it is one of the most important interfaces between chemistry and everyday life. Every time you start your car, turn on your calculator, look at your digital watch, or listen to a radio at the beach, you are depending on electrochemical reactions. Our society sometimes seems to run almost entirely on batteries. Certainly the advent of small, dependable batteries along with silicon-chip technology has made possible the tiny calculators, tape recorders, and clocks that we take for granted.

Electrochemistry is important in other less obvious ways. For example, the corrosion of iron, which has tremendous economic implications, is an electrochemical process. In addition, many important industrial materials such as aluminum, chlorine, and sodium hydroxide are prepared by electrolytic processes. In analytical chemistry, electrochemical techniques employ electrodes that are specific for a given molecule or ion, such as H^+ (pH meters), F^- , Cl^- , and many others. These increasingly important methods are used to analyze for trace pollutants in natural waters or for the tiny quantities of chemicals in human blood that may signal the development of a specific disease.

Electrochemistry is best defined as *the study of the interchange of chemical and electrical energy*. It is primarily concerned with two processes that involve oxidation-reduction reactions: the generation of an electric current from a chemical reaction, and the opposite process, the use of a current to produce chemical change.

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of electric energy that girdles the earth in the ionosphere above the magnetic equator and near the auroral displays
electro-kin-net-ics (ē lek'trō kī net'iks, i: -trā-) *n.* the branch of electromagnetics dealing with electricity in motion, or electric currents; cf. **ELECTROSTATICS**
electro-lysis (ē lek'trō lī'sis, i: -trā-) *n.* a practitioner of **ELECTROLYSIS** (sense 2)

electro-lu-mi-nes-cence (ē lek'trō lū'mī nes'ens, i: -trā-) *n.* the emission of cold light by certain substances when acted upon by an alternating electric field — **electro-lu-mi-nes-cent** *adj.*

electro-lysis (ē lek'trō lī'sis, i: -trā-) *n.* **ELECTRO-** + **-LYSIS** 1 the decomposition of an electrolyte by the action of an electric current passing through it 2 the removal of unwanted hair from the body by destroying the hair roots with an electrified needle

electro-lyte (ē lek'trō līt', i: -trā-) *n.* **ELECTRO-** + **-LYTE** 1 any chemical compound that ionizes when molten or in solution, allowing it to conduct electricity

electro-lytic (ē lek'trō līt'ik, i: -trā-) *adj.* 1 of or produced by electrolysis 2 of or containing an electrolyte — **electro-lyt'i-cally** *adv.*

electro-lyze (ē lek'trō līz, i: -trā-) *vt.* -lyzed, -lyz'ing to subject to, or decompose by, electrolysis

electro-mag-net (ē lek'trō mag'net, i: -trā-) *n.* a soft iron or steel core surrounded by a coil of wire, that temporarily becomes a magnet when an electric current flows through the wire

electro-mag-netic (ē lek'trō mag'net'ik, i: -trā-) *adj.* of, produced by, or having to do with electromagnetism or an electromagnet — **electro-mag-net'i-cally** *adv.*

electromagnetic interaction (or force) *Particle Physics* the relatively long-range interaction between elementary particles resulting from their electric and magnetic fields, responsible for molecular structure, chemical reactions, and other electromagnetic phenomena; see **STRONG INTERACTION**, **WEAK INTERACTION**

electromagnetic spectrum the complete range of frequencies of electromagnetic waves from the lowest to the highest, including, in order, radio, infrared, visible light, ultraviolet, X-ray, and gamma ray waves

electromagnetic wave a wave propagated through space or matter by oscillating electric and magnetic fields, in a vacuum it travels at the speed of light

electro-mag-net-ism (ē mag'na tiz'm) *n.* 1 magnetism produced by an electric current 2 the interaction between a magnetic field and an electric field 3 the phenomena produced by such an interaction 3 the branch of physics that deals with electricity and magnetism

electro-mechan-i-cal (ē ma kan'i kəl) *adj.* designating or of a mechanical device or operation that is actuated or regulated by electricity

electro-met-al-lurgy (ē met'ə lūr'jē) *n.* the branch of metallurgy having to do with the use of electricity, as for producing heat in smelting, refining, etc., or for refining, plating, or depositing metals by electrolysis

electrometer (ē lek'trō mē'tər, ē lek'trō-) *n.* 1 a device for detecting or measuring differences of potential by means of electrostatic forces 2 an active circuit arrangement for measuring differences of potential without drawing appreciable current

electro-mot-ive (ē lek'trō mō'tiv, i: -trā-) *adj.* 1 producing an electric current through differences in potential 2 relating to electromotive force

electromotive force the force or electric pressure that causes or tends to cause a current to flow in a circuit, equivalent to the potential difference between the terminals and commonly measured in volts, abbrev. *E*, *EMF*, or *emf*

electro-my-o-graph (ē mī'ō grāf, mī'ō-) *n.* an instrument that displays and records a graphic tracing (electromyogram) of the minute voltage changes in muscle tissue, used in the diagnosis of muscle and nerve disorders; the tracing is made audible by connecting the voltage to a speaker — **electro-my-o-graphic** *adj.* — **electro-myog'ra-phy** (ē grō fē) *n.*

electron (ē lek'trōn, i: -trā-) *n.* [coined 1891] by G. J. Stoney (1826-1911), Ir. physicist < **ELECTRIC** + **-ON** *Particle Physics* the lightest elementary particle with an electric charge. It is a lepton with a negative charge of $c. 1.602 \times 10^{-19}$ coulomb and a rest mass of $c. 9.109 \times 10^{-31}$ kg (c. 0.51) MeV/c², which is c. 1/1836 of the mass of a proton; ordinarily an atom has the same number of negative electrons around the nucleus as the number of positive protons in the nucleus; see also **POSITRON**, **NEGATRON**

electro-nega-tive (ē lek'trō neg'atīv, i: -trā-) *adj.* 1 having a negative electrical charge; tending to move to the positive electrode, as in electrolysis 2 having the ability to attract electrons, esp. in forming a chemical bond — *n.* an electronegative substance

electron gun the part of an electron tube, esp. a cathode-ray tube, that emits, accelerates, and controls a beam of electrons

electronic (ē lek'trōn'ik, ē lek'trō-) *adj.* 1 of or having to do with electrons 2 operating, produced, or done by the action of electrons or other carriers in semiconductor, vacuum tubes, etc. 3 carried on by or making use of electronic equipment [electronic banking, electronic journalism] — **electronic'i-cally** *adv.*

electronic mail *E-MAIL* (sense 1)

electronic music music in which the sounds are originated, organized, or altered by electronic devices

electronic organ a musical instrument with a console like that of a pipe organ, but producing tones by means of electronic devices

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electrokinetics / electrosurgery

electronic publishing the publishing of information, books, etc. in a format accessible by computer

electron-ics (ē lēk's, i: -trā-) *n.* the science that deals with the behavior and control of electrons in vacuums and gases, and with the use of electron tubes, photoelectric cells, transistors, etc. — *pl.* **electron-ics** equipment, systems, etc.

electron lens a configuration of electric or magnetic fields, or a combination of both, that serves to focus or deflect an electron beam, as in an electron microscope

electron microscope an instrument that focuses a beam of electrons on an object, using electric or magnetic fields, to form an enlarged image of the object on a fluorescent screen, photographic plate, or cathode-ray tube; specif., such an instrument in which the beam of electrons passes directly through an extremely thin object and forms a two-dimensional image; it is much more powerful than any optical microscope; cf. **SCANNING ELECTRON MICROSCOPE**

electron multiplier a device that amplifies a stream of electrons by causing it to strike electrodes or successively higher potentials; secondary electrons produced at each electrode increase the quantity of electrons in the stream

electron optics the branch of electronics having to do with the focusing and deflection of beams of electrons by means of electric and magnetic fields, which act upon the beams in the same way that lenses act on light rays

electron telescope an instrument using a cathode-ray tube to form a visible image of infrared rays brought into focus from a distant object by optical lenses

electron tube a sealed tube, usually of glass, containing a vacuum or a gas and electrodes that are connected to pinlike terminals that protrude from the base, used as a plug-in component in an electronic device to control the flow of electrons

electron volt a unit of energy equal to that attained by an electron falling unimpeded through a potential difference of one volt: 1.602×10^{-19} joule; abbrev. *eV*; often written **elec'tron-volt** *n.* or **electron-volt**

electro-op-tics (ē lek'trō op'tiks, i: -trā-) *n.* the technology that deals with the production, control, and detection of light by electrical devices — **electro-op'tic** *adj.* or **electro-op't'i-cal** — **electro-op't'i-cally** *adv.*

electro-os-mo-sis (ē os'mō'sis, ē os'mō'sis) *n.* osmosis through a membrane that is caused by the action of an electric field, usually such a field generated by two electrodes, one on each side of the membrane — **electro-os-mo'tic** (ē mō'tik) *adj.*

electro-phill-ic (ē lē'ik) *adj.* designating or of a chemical, ion, etc. that accepts additional electrons

electro-pho-re-sis (ē fō'rē'sis) *n.* [**MODL** < **ELECTRO-** + (**CATA**PHORESIS)] the migration of charged colloidal particles or of molecules through a fluid or gel subjected to an electric field — **electro-pho-ret'ic** (ē fō'ret'ik) *adj.*

electrophorus (ē lek'trō fō'rəs, ē lek'trō-, i: -trā-) [**MODL** < **ELECTRO-** + **Gr.** *phoros*, bearing < *pherein*, BEAR] an apparatus consisting of an insulated resin disk and a metal plate, used in generating static electricity by induction

electro-phys-iol-o-gy (ē lek'trō fīz'ē-ō-lō-jē, i: -trā-) *n.* 1 the study of the electrical properties of living cells 2 the study of the production of electric currents by living organisms — **electro-phys-iol-og'i-cal** (ē fīz'ē-ō-lō-jē kəl) *adj.* — **electro-phys-iol-o-gist** *n.*

electro-plate (ē lek'trō plāt', i: -trā-) *vt.* -plated, -plat'ing to deposit a coating of metal on by electrolysis

electro-posi-tive (ē lek'trō pōz'itīv, i: -trā-) *adj.* 1 having a positive electrical charge; tending to move toward the negative electrode, as cathode, in electrolysis 2 having the ability to give up electrons, esp. in forming a chemical bond — *n.* an electropositive substance

electroscope (ē lek'trō skōp', i: -trā-) *n.* an instrument for detecting very small charges of electricity, electric fields, or radiation; it can indicate whether they are positive or negative, as by the divergence of electrically charged strips of gold leaf; when fitted with optical means for quantitative observation of the divergence, an electroscope serves as an electrometer — **electro-scop'ic** (ē skōp'ik) *adj.*

electro-shock therapy (ē shak'thē-rē-pi) a form of shock therapy in which electric current is applied to the brain; see also **SHOCK THERAPY**

electro-stat-ic (ē lek'trō stat'ik, i: -trā-) *adj.* 1 of or having to do with electrostatics 2 designating or of a speaker in which electric force is applied to metal plates, causing a diaphragm suspended between them to vibrate — **electro-stat'i-cally** *adv.*

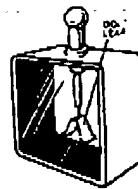
electrostatic generator a generator which produces high-voltage electricity by electrostatic induction; sometimes used in accelerate charged particles for nuclear reactions

electro-statics (ē stat'iks) *n.* the branch of electromagnetism theory dealing with electric charges at rest, or static electricity; cf. **ELECTROKINETICS**

electrostatic units the system of CGS electric and magnetic units that assigns the value of one to the dielectric constant of a vacuum

electro-surgery (ē sūr-jrē) *n.* the use of electricity in surgery, as in cauterizing

See the inside front cover for pronunciation information.
 The symbol * is used to mark terms of American origin.



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e·lec·tron·ic [i-lek-tron-ik, ee-lek-] [Pronunciation Key](#) - [Show IPA](#)

Pronunciation

-adjective

1. of or pertaining to electronics or to devices, circuits, or systems developed through electronics.
2. of or pertaining to electrons or to an electron.
3. (of a musical instrument) using electric or electronic means to produce or modify the sound.
4. of, pertaining to, or controlled by computers, or computer products and services.

[Origin: 1900-05; ELECTRON + -IC]

—Related forms

e·lec·tron·i·cal·ly, *adverb*

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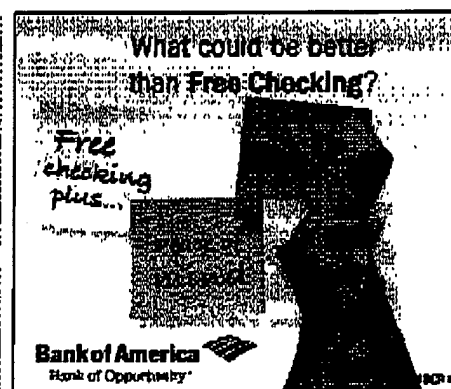
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e·lec·tron·ic (ī-lĕk-trŏn'ĭk, ē'lĕk-) Pronunciation Key

adj.

1. Of or relating to electrons.
2. Of, based on, operated by, or otherwise involving the controlled conduction of electrons or other charge carriers, especially in a vacuum, gas, or semiconducting material.
3. Of, relating to, or produced by means of electronics: *electronic navigation; electronic books*.
4. Of or relating to music produced or altered by electronic means, as by a tape recorder or synthesizer.
5. Of, implemented on, or controlled by a computer or computer network.

e·lec'tron'i·cal·ly *adv.*

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electronic

adjective

1. of or relating to electronics; concerned with or using devices that operate on principles governing the behavior of electrons; "electronic devices"
2. of or concerned with electrons; "electronic energy"

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electronic¹ [elɛk'tronik] *adjective*

worked or produced by devices built or made according to the principles of electronics

Example: *an electronic calculator*

Arabic: إلكتروني

Chinese (Simplified): 电子的

Chinese (Traditional): 電子的

Czech: elektronický

Danish: elektronisk;
elektron-

Dutch: elektronisch

Estonian: elektron-

Finnish: elektroninen

French: électronique

Japanese: 電子の

Korean: 전자(공학)의

Latvian: elektronisks

Lithuanian: elektroninis

Norwegian: elektronisk,
elektron-

Polish: elektroniczny

Portuguese (Brazil): eletrônico

Portuguese (Portugal): electrónico

Romanian: electronic

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German: elektronisch
 Greek: ηλεκτρονικός
 Hungarian: elektronikus
 Icelandic: rafeinda-,
 rafeindatækni-,
 raftækniægur
 Indonesian: elektronik
 Italian: elettronico

Russian: электронный
 Slovak: elektronický
 Slovenian: elektronski
 Spanish: electrónico
 Swedish: elektronisk
 Turkish: elektronik

electronic² [eləkt'ronik] *adjective*
 concerned or working with such machines
 Example: an electronic engineer

Arabic: إلكتروني
 Chinese (Simplified): 电子学的
 Chinese (Traditional): 電子學的
 Czech: elektronický
 Danish: elektronikingeniør,
 elektronik-
 Dutch: elektronisch
 Estonian: elektroonika-
 Finnish: elektroniikka-
 French: électronique
 German: Elektronik-...
 Greek: ηλεκτρονικός
 Hungarian: elektronikai,
 elektronikus
 Icelandic: rafeinda-,
 raftækni-
 Indonesian: ahli elektronika
 Italian: elettronico

Japanese: 電子工学の
 Korean: 컴퓨터와 관련된
 Latvian: elektronu-
 Lithuanian: elektronikos
 Norwegian: elektro-
 Polish: elektronik
 Portuguese (Brazil): eletrônico
 Portuguese (Portugal): electrónico
 Romanian: electronic
 Russian: специализирующийся
 на электронике
 Slovak: elektronický
 Slovenian: elektronski
 Spanish: electrónico
 Swedish: elektron-, elektronik-
 Turkish: elektronik

See also: electron, electronics, electronic mail

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electronic ⓘ ⓘ (i-lĕk'trŏn'ĭk) Pronunciation Key

Relating to electrical devices that amplify and process electrical
 signals. Audio amplifiers, radios, and digital circuitry are electronic
 devices. ◊ The scientific study of the behavior and design of
 electronic devices and circuits is called **electronics**. Compare electric.

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Main Entry: **elec·tron·ic**

Pronunciation: i-'lek-'trän-ik

Function: *adjective*

: of or relating to electrons or electronics —**elec·tron·i·cal·ly** /-i-k
 (ə-)lē/ *adverb*

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